K. V. Krombein

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# ENTOMOLOGICAL NEWS

**NOVEMBER, 1938**

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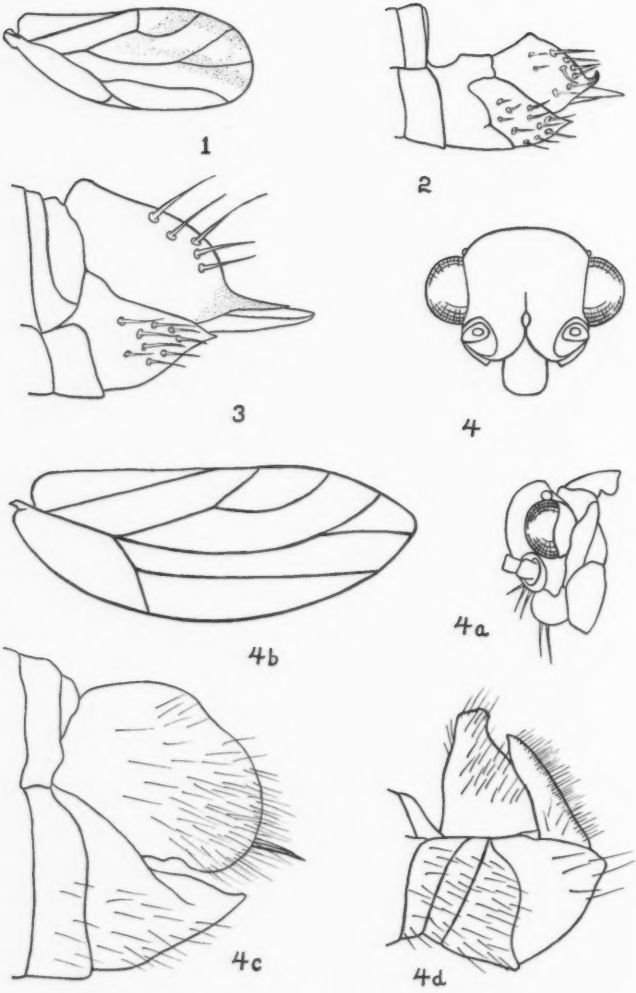


PSYLLA NANA 1, TRIOZA SHEPHERDIAE 2, T. CHLORA 3, LEVIDEA LINEATA 4-4D.—TUTHILL

# ENTOMOLOGICAL NEWS

VOL. XLIX. NOVEMBER 1938 No. 9

## Some New North American Psyllidae (Homoptera).

By L. D. TUTHILL, Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

(Plate V.)

The writer has been working on a critical review of North American Psyllidae for the past two years. Some of the new forms encountered are described in this paper. The material is from the U. S. National Museum, the University of Kansas, and the author's collection. The writer would like to obtain as much North American material as is available and will gladly determine material in this group for the privilege of studying it.

**Arytaina hirsuta** n. sp.

Similar to *A. pubescens* in size and pubescence but reddish in color, wings reddish brown, genitalia quite distinct. Length to tip of folded wings, 2.00-2.25 mm.

*Color:* General body color, including legs, red. Head and thoracic dorsum with prominent white pubescence. Disc of vertex white, except medial line and two foveae black; antennae black at tip. Thoracic dorsum white, heavily marked with black and red; scutum definitely striped. Forewings reddish fumate, darker toward apex. Veins red.

*Structure:* Head deflexed, slightly broader than thorax. Discal foveae and medial suture of vertex very prominent. Postero-lateral portions of vertex, which bear ocelli, prominently raised. Genal cones quite sharp, pubescent. Antennae about one and one-half times as long as width of head. Thorax heavily pubescent, granular. Forewings twice as long as broad, coriaceous; pterostigma short and broad.

*Genitalia:* Male proctiger longer than forceps, narrow in lateral view; forceps longer than in *pubescens,* strongly curved inward, tapering to apices which bear small black hooks, the postero-medial margin with very heavy golden pubescence. Female genital segment short, constricted midway and very narrow to apex; dorsal valve slightly longer than ventral.

*Holotype,* male, *allotype,* female, two male and fourteen female paratypes, Lapine, OREGON, July 2, 1935, P. W. Oman; other paratypes as follows: one male, Klamath, Ore., July 1, 1935, one female, Bend, Ore., July 2, 1935, P. W. Oman; one female, Lapine, Ore., July 2, 1935 and one female, Reno, NEVADA, June 26, 1935, R. H. Beamer.

Holotype, allotype and paratypes in U. S. National Museum. Paratypes in Snow Collection, University of Kansas, and author's collection.

**Psylla nana n. sp.**

(Plate V, Fig. 1.)

Resembling *Psylla minuta* but the forewings definitely maculate, the vertex and thoracic dorsum not pubescent and the genal cones much smaller. Length to tip of folded wings, 2.00-2.25 mm.

*Color:* General body color, including legs, dirty white, with orange markings. Vertex white with margins, median line and discal foveae orange; genal cones white; antennal segments dark on apices, last two segments black. Thoracic dorsum with a median orange line, a pair of broader orange stripes on each side of scutum. Forewings more or less fumate in basal half; membrane whitish with somewhat irregular brown maculae as illustrated; veins white.

*Structure:* Head of median size, vertex bulging forward between antennae, with medial suture and discal foveae prominent. Genal cones small, short, blunt, somewhat pubescent. Antennae about twice as long as width of head. Thorax relatively flat. Forewings two and one-third times as long as broad, broadly rounded; pterostigma very short.

*Genitalia:* Male genitalia quite large. Proctiger slightly longer than forceps, tapering from rather broad base, apex bent posteriorly at right angles. Forceps fairly broad in lateral view, curved forward and then posteriorly near apices, apices black. Female genital segment shorter than rest of abdomen, dorsal valve straight on dorsal side; ventral valve evenly curved up to apex, slightly exceeded by dorsal valve.

*Holotype,* male, *allotype,* female, and one male paratype, Santa Rita Mts., ARIZONA, July 17, 1932, R. H. Beamer; two male and four female paratypes, Patagonia, Ariz., June 24, 1933, P. W. Oman.

Holotype, allotype and paratype in Snow Entomological Collection, University of Kansas; paratypes in U. S. National Museum and author's collection.

**Trioza shepherdiae** n. sp.

(Plate V, Fig. 2.)

This typically triozine species does not resemble very closely any of the known North American members of this genus. Length to tip of folded wings, 2.50 mm.

*Color:* General color of head, thoracic dorsum and legs light testaceous to fulvous. Vertex light except discal foveae; genal cones, eyes, distal half of antennae dark. Prescutum with a pair of brown stripes halfway back. Scutum with two inverted V-shaped, brown marks. Wing membranes slightly fumate; veins brown. Abdomen brown to black.

*Structure:* Head and thoracic dorsum coarsely granular. Head of medium size, narrower than thorax. Vertex decidedly emarginate in front, with very prominent discal foveae, postero-lateral angles, which bear ocelli, raised. Genal cones short, about one-half as long as vertex, conical, almost parallel to plane of vertex. Antennae about one and one-half times as long as width of head. Pronotum depressed. Prescutum strongly arched. Forewings two and one-half times as long as wide, membrane rather thick, slightly rugose, venation typical. Hind wings more rugose than forewings. Legs of medium length, hind tibiae with one spine outside, two inside.

*Genitalia:* Male genital segment small. Proctiger as long as forceps, almost right-triangular in lateral view, posterior lobe of medium length. Forceps slender, irregularly narrowed to sharp apices, with medium pubescence. Female genital segment short, dorsal valve decidedly longer than ventral, terminating in a heavy, black, up-curved hook, usually exceeded by partially extended ovipositor sheath.

*Holotype,* female, *allotype,* male, 45 female and 9 male paratypes, Lake City, Colorado, June 29, 1937, L. D. Tuthill; 26 female and 5 male paratypes were collected by R. H. Beamer at the same time. Holotype, allotype and paratypes in author's collection, paratypes in Snow Entomological Collection, University of Kansas, and U. S. National Museum.

This species was taken on *Shepherdia canadensis* (L.) Nutt. growing in a dense stand beneath aspen.

**Trioza chlora** n. sp.

(Plate V, Fig. 3.)

In Crawford's key this species runs to *albifrons*. It is, however, quite unlike the latter species. The genal cones are less acute, less divergent and are directed downward; the wings are very slender and acute at apex. Length to tip of folded wings, 3.25-3.50 mm.

*Color:* General color white to yellow except eyes and apical two-thirds of antennae black. Thoracic dorsum and vertex deeper yellow to orange. Wings hyaline.

*Structure:* Head medium in size, post-ocular occipital region very large giving the eyes the appearance of projecting forward. Vertex evenly excavated, rather deeply emarginate in front, extending forward over front ocellus. Genal cones vertical, about as long as vertex, rather acute. Antennae twice as long as width of head. Thorax strongly arched. Forewings almost three times as long as broad, sharply angled. Venation typical triozine.

*Genitalia:* Male genitalia small. Proctiger broad at base, tapered to slightly produced apex, bearing a black spine at base on either side. Forceps slightly shorter than proctiger, broad in lateral view, anterior margin almost straight, posterior margin slightly curved, apex roundly truncate and slightly produced anteriorly; apical margin brown. Female genital segment shorter than rest of abdomen, basal portion subglobular, apex a short, brown styliform elongation; dorsal valve slightly longer than ventral.

*Holotype*, male, Pearce, ARIZONA, Aug. 23, 1935, R. H. Beamer; *allotype*, female, Huachuca Mts., Ariz., Aug. 22, 1935, R. H. Beamer. Types in Snow Entomological Collection, University of Kansas.

RHINOPSYLLA SCHWARZI Riley

This species which has been known heretofore only from two males is represented in the Snow Collection by two females. They are similar to the males except that the fore femora are not enlarged, this apparently being a secondary sexual character.

The female genital segment is short, the dorsal valve narrowly hood-shaped, overhanging the ventral valve, the latter scarcely produced, slit at apex.

*Allotype,* female, Ponce de Leon, FLORIDA, July 13, 1934, R. H. Beamer, and *parallotype,* same data, in the Snow Entomological Collection, University of Kansas.

**LEVIDEA** n. gen.

Head small, much narrower than thorax, deflexed; vertex smooth, perpendicular, slightly rounded, median suture lacking or at least not apparent except just above front ocellus; genae somewhat swollen below antennae, almost touching; clypeus large and globose, visible from front; antennae moderate in length, longer than width of head. Thorax moderately arched; episternum of pronotum produced laterally around posterior of eye. Wings triozine in venation and shape, pointed at apex, somewhat thickened and maculate. Legs rather short, apex of hind tibia with two spines inside, one outside.

*Genotype, Levidea lineata,* n. sp.

**Levidea lineata** n. sp.

(Plate V, Figs. 4, 4a, 4b, 4c, 4d.)

Length to tip of folded wings, 3.00-3.50 mm.

*Color:* General body color, including legs, stramineous. Vertex and genae light, antennae darker. Eyes dark. Two brown lines extending across prescutum, sometimes incomplete, continuing on scutum as a diverging pair of lines. Membrane of forewings with small brown spots, very thick at anal margin to sparse on costal margin, the veins unspotted except at marginal cells, thus giving general appearance of stripes.

*Structure:* Head very small, strongly deflexed; vertex slightly swollen in appearance, perfectly smooth except for two very small foveae near the occipital margin and remnant of medial suture above front ocellus. Genae slightly swollen. Clypeus very large, visible from front or side. Antennae twice as long as width of head. Thorax moderately arched, the episternum of the pronotum developed out and around the occiput. Forewings slightly more than twice as long as wide, without pterostigma or cubital petiole, marginal cells about equal.

*Genitalia:* Male genitalia large, proctiger triangular in outline, broad at base, slightly longer than forceps which are simple, tapering from base to acute apices, quite strongly arched, apices touching, pubescent on posterior margins. Female genital segment large with rather dense, silky pubescence; dorsal valve very large, hood-shaped, ventral valve smaller, sharply pointed.

*Holotype*, female, *allotype*, male, 9 female and 4 male paratypes, Mustang Mt., ARIZONA, June 12 and 20, 1933, P. W. Oman; 3 female and 1 male paratypes, Mustang Mt., Ariz., June 12, 1933, R. H. Beamer. Holotype, allotype and paratypes in U. S. National Museum. Paratypes in Snow Entomological Collection, University of Kansas and in author's collection.

Mr. Oman says that this unique species apparently lives upon "wild rubber," *Parthenium incanum*.

EXPLANATION OF PLATE V.

Fig. 1. *Psylla nana*, forewing.
Fig. 2. *Trioza shepherdiae*, ♀ genitalia.
Fig. 3. *Trioza chlora*, ♀ genitalia.
Fig. 4. *Levidea lineata*, front view of head.
Fig. 4a. *Levidea lineata*, lateral view of head.
Fig. 4b. *Levidea lineata*, forewing.
Fig. 4c. *Levidea lineata*, ♀ genitalia.
Fig. 4d. *Levidea lineata*, ♂ genitalia.

## A Bibliography of Keys for the Identification of Immature Insects. Part I. Diptera*.

By WM. P. HAYES, University of Illinois.

Nowhere in entomological literature are bibliographies available to assist in locating works containing keys or tables for the identification of immature insects. The work of Banks listing the keys for adult insects has been of great value to persons looking for keys to adults and it should be brought up to date. We have no such work treating the immature stages. A few institutions throughout the United States are now offering some work in the taxonomy of immature insects. Having been engaged in teaching such a course for twelve years, the writer has accumulated a rather comprehensive bibliography of papers which contain such keys. Mimeographed copies listing the available works in the various orders have been of much use to students and requests for copies from workers throughout the country are frequently received. It is hoped to supplement this work in the near future with bibli-

* Contribution No. 195 from the entomological laboratories of the University of Illinois.

ographies of the other important orders.

"It looks like a muscid larva but we will have to rear it to the adult stage to be sure." This, or some such phrase, is on the lips of almost everyone engaged in the determination of insects for the public. Taxonomic works of the sort here listed are attempts to alleviate this lack of information. It is granted that the field of taxonomy of immature insects is in an immature stage, nevertheless in a number of the orders keys are available to help us recognize at least the more common species.

Among the Diptera, the aquatic forms are perhaps the best known in their developmental stages as is evidenced by the numerous keys to such groups as the Culicidae and Chironomidae and the recent (1934, 1935 and 1937) works of Johannsen. The important work of Malloch (1917) is the most comprehensive work treating of the Orthorrhapha. The Cyclorrhapha have been keyed, mostly, only in connection with those species causing myiasis or affecting the health of man.

The following list is offered as an aid to those who wish to identify larvae and pupae of Diptera. It is not complete and the writer would welcome additional citations.

### General Keys.

Alexander, C. P. 1930. Observations on the dipterous family Tanyderidae, *Proc. Linn. Soc. N. S. Wales*, 55: 221-230. (Larval key to families of Orthorrhapha, pp. 225-228.)

Balachowsy, A. and L. Mesnil. 1935. [Key to brachycerous larvae attacking grains and cereals.] In: Les insectes nuisibles aux plantes cultiveés etc. Busson, Paris, Vol. I, 1137 pp. (Key to genera and species, pp. 913-923.)

Banks, N. 1912. The structure of certain dipterous larvae with particular reference to those in human foods. *U. S. D. A. Bur. Ent., Tech. Bull.* 22, pp. 1-44. (Key to some families and genera, p. 15.)

Beling, Th. 1882. Beitrag zur metamorphoses zwei-flügeliger Insecten aus den Familien Tabanidae, Leptidae, Asilidae, Empidae, Dolichopodidae und Syrphidae. *Arch. Naturg.*, 44: 187-240. (Larval key to genera of these families pp. 236-240.)

Brauer, F. 1883. Die zweiflügler des kaiserlichen Museums zu Wien III. Systematische Studien auf Grundlage der Dipternlarven, etc. *K. Akad. Wiss.* (Vienna), *Math.-Naturw.*

Vol. 47, pp. 1-100. (Larval key to families of Orthorrhapha, pp. 17-19; key to genera of Oestridae pp. 36-38; good bibliography of earlier references to larvae.)

BRUES, C. T. and A. L. MELANDER. 1932. Classification of Insects. *Bull. Mus. Comp. Anat.* Harvard. Vol. 73, 672 pp. (Larval key to principal families, pp. 352-368; pupae of principal families, pp. 370-376.)

BUTOVITSCH, V. von, and W. LEHNER. 1933. Bestimmungstabelle der wichtigsten in märkischen Kiefernwaldboden vorkommenden Insektenlarven. J. Springer Co., Berlin, 16 pp. (Keys to families of larvae inhabiting pine forest soil, p. 5.)

FELT, E. P. 1917. [Key to American insect galls.] *N. Y. State Mus., Bull.* 200.

FROST, S. W. 1924. A study of the leaf-mining Diptera of North America. *Cornell Agr. Exp. Sta., Memoir* 78, pp. 1-228. (Key to the more common leaf-mining Diptera based on the type of mine, pp. 19-20; larval key to families, p. 29; larval key to Agromyzidae, pp. 37-38.)

GREENE, C. T. 1918. [Table of common fly larvae.] In: Mimeographed Proceedings of the Class to Study Entomology of Disease, Hygiene and Sanitation. Lecture 15. Sept. 9, 1918, p. 217. Washington, D. C.

ID. 1921. Table to separate larvae (maggots). In: Sanitary Entomology by W. D. Pierce. Badger Pub. Co., Boston, 518 pp. (Larval key to house fly and related species, pp. 142-144.)

GRÜNBERG, K. 1910. Diptera, Zweiflüger. In: *Brauer, Süsswasserfauna Deutschlands,* Heft 2 A, 312 pp. Fisher, Jena. (Larval key to aquatic families, pp. 13-15; Culicidae, p. 80; Stratiomyidae, p. 113.)

HALIDAY, A. H. 1857. List of Genera of British Diptera, the earlier stages of which are more or less perfectly known, etc. *Nat. Hist. Rev.,* IV, p. 177. (A list with family characters of larvae.)

HART, C. A. 1895. Entomology of the Illinois River, Diptera. In *Bull. Ill. State Lab. Nat. Hist.* Vol. 4 (art 6) pp. 184-270. (Key to families of larvae and pupae of aquatic Diptera, pp. 186-189.)

HEGNER, R., R. M. ROOT and D. L. AUGUSTINE. 1929. Animal Parasitology, Century Biological Series, Century Co., N. Y., 731 pp. (Larval key to genera of some common muscoid flies, pp. 584-585.)

HENDEL, F. 1928. Zweiflügler oder Diptera II. Allgemeiner Teil. In: *Die Tierwelt Deutschlands,* Part II, pp. 1-135, Fischer, Jena. (Larval key to families, pp. 113-131; key to

principal forms of pupae, pp. 111-112.)

HERING, M. 1935-1937. Die Blatt-Minen Mittel-und Nord-Europas. Bestimmungs-Tabellen aller von Insekten-larven der verschiedenen Ordnungen erzeugten Minen, Lief. I-VI, pp. 1-112. Gustav Feller, Neubrandenberg; (Lieferung VI not yet published). (Arranged alphabetically by food plants.)

ISAACS, I. M. 1923. Key to the identification of the dipterous families and certain subgroups . . . relating to myiasis. In: Herms, Medical and Veterinary Entomology, Macmillan Co., N. Y. (Larval key p. 315 includes some Trypetidae, Oestridae, Anthomyiidae, Muscidae, Sarcophagidae, and Drosophilidae.)

JOHANNSEN, O. A. 1903. Aquatic nematocerous Diptera. Aquatic Insects in New York State. *New York State Mus., Bull.* 68, pp. 328-441. (Key to families of larvae and pupae and some keys to species, pp. 329-332.)

ID. 1934. Aquatic Diptera, Part I. Nemocera, exclusive of Chironomidae and Ceratopogonidae. *Cornell Univ. Agr. Exp. Sta., Mem.* 164, pp. 1-71, 24 pl. (Many keys to this group.)

ID. 1935. Aquatic Diptera, Part II. Orthorrhapha, Brachycera and Cyclorrhapha. *Cornell Univ. Agr. Exp. Sta., Mem.* 177, pp. 1-62. (Many keys to this group. For Part III see Chironomidae.)

KARNY, H. H. 1934. Biologie der Wasserinsekten. Fritz Wagner, Wien, 311 pp. (Key to families, pp. 187-190.)

LAMPERT, K. 1910. Das Leben der Binnengewässer. Leipzig, 1910. 856 pp. (Larval key to genera of Aquatic Diptera, p. 166.)

MALLOCH, J. R. 1915. Some additional records of Chironomidae for Illinois and notes on other Illinois Diptera. *Bull. Ill. State Lab. Nat. Hist.*, Vol. II, pp. 304-363. (Key to some Ill. pupae of Bombyliidae, Mydaidae, Asilidae and Therevidae, pp. 325-327.)

ID. 1927. A preliminary classification of Diptera, exclusive of puparia, based upon larval and pupal characters, with key to imagos in certain families. Part I. *Bull. Ill. State Lab. Nat. Hist.*, 12: 161-407. (Many keys to larvae and pupae. Best American work.)

NEEDHAM, J. G. 1918. Key to North American aquatic dipterous larvae. In: Ward and Whipple, Fresh Water Biology, John Wiley and Sons, N. Y., 1111 pp. (Prepared by O. A. Johannsen.) (Key to families and genera, pp. 943-946.)

NEEDHAM, J. G., S. W. FROST and B. H. TOTHILL. 1928. Leaf mining insects. Williams and Wilkins Co., Baltimore, Md., 295 pp. (Key to dipterous mines, p. 239; key to *Agro-*

*myza*, p. 249; *Phytomyza*, p. 261.)

PATTON, W. W. 1922. Notes on the myiasis-producing Diptera of man and animals. *Bull. Ent. Res.*, 12: 239-261. (Key to larvae, p. 258.)

RILEY, W. A. and O. A. JOHANNSEN. 1932. Medical entomology. 476 pp. McGraw, Hill and Co., N. Y. (Larval key to families and some genera of aquatic diptera, pp. 194-195; larval key to bots, Oestridae, pp. 309-310; key to three instars of myiasis producing larvae, in part after S. M. Tao. p. 309-376.)

SEGUY, E. 1926. Diptera (Brachyceres). In: *Fauna de France.* Vol. 13, pp. 1-308. (Larval key to families, p. 14, a translation into French of Brauer's key.)

SHARP, D. 1909. [Key to families of Brachycera and also Platypezidae, Pipunculidae and Syrphidae.] In: *Verral, British Flies,* Vol. 5. Gurney and Jackson, London. (This is a translation of Brauer's key. Key to families only.)

TAO, S. M. 1927. A comparative study of the early larval stages of some common flies. *Amer. Jour. Hyg.*, 7: 735-761. (Keys to first and second instars. This key is reproduced and a third instar key appended in Riley and Johannsen, 1932.)

KEYS TO SPECIAL GROUPS.

TIPULOIDEA.

ALEXANDER, C. P., and J. T. LLOYD. 1914. The biology of the North American crane-flies. (Tipulidae, Diptera I. The genus *Eriocera* Macquart.) *Journ. Ent. and Zool.* (Pomona) 6: 12-23. (Key to larvae, p. 19; key to pupae, p. 20.)

ALEXANDER, C. P. 1914. Biology of the North American crane-flies. (Tipulidae, Diptera.) II. *Liogma nodicornis,* Osten Sacken. *Jour. Ent. and Zool.* (Pomona) 6: 105-118. (Key to larvae of Cylindrotomini, pp. 109-110, and key to larvae and pupae of the genus *Liogma,* pp. 110-111.)

ID. 1915. The biology of the North American crane-flies. (Tipulidae, Diptera.) IV. *Journ. Ent. and Zool.* (Pomona) 7: 141-158. (Key to larvae and pupae of the tribe Hexatomini, p. 148.)

ID. 1920. The crane-flies of New York, Part II. *Cornell Univ. Agr. Exp. Sta. Memoir* 38, pp. 695-1133. (Key to larvae and pupae of the superfamily Tipuloidea, including Tipulidae, Anisopidae (Rhyphididae), Tanyderidae and Ptychopteridae.)

ID. 1930. Observations on the dipterous family Tanyderidae. *Proc. Linn. Soc. N. S. Wales,* 55: 221-230. (Key to pupae of related families, p. 228.)

BELING, T. 1878. Zweiter Beitrag zur Naturgeschichte (Metamorphose) verschiedener Arten aus der Familie der Tipuliden. *Verhand. d. k. k. Zool. Bot. Ges.* Wien, 28: 21-56. (Larval key to species of *Pachyrnia*, p. 44.)

ID. 1886. Dritter Beitrag zur Naturgeschichte (Metamorphose) verschieden Arten aus der Familie der Tipuliden. *Verhand. d. k. k. Zool. Bot. Ges.* Wien, 36: 171-214. (Larval key to various genera, pp. 203-206; species of *Tipula*, pp. 206-213.)

LENZ, F. 1919. Die Metamorphose der Cylindrotomiden. *Archiv. Naturges.* Vol. 85, (Heft 6, Abt. A.), pp. 113-146. (Larval key to genera, pp. 129-130.)

ROGERS, J. S. 1933. Contribution toward a knowledge of the natural history and immature stages of the crane-flies. The genus *Polymera* Weidemann. *Occasional Papers Mus. Zool. Univ. Mich.* No. 268, pp. 1-13. (Larval and pupal key to two species of this genus, p. 11.)

See also the keys of Malloch, 1917; Grünberg, 1910; Hart, 1895; and Johannsen, 1934; cited under general keys.

BLEPHEROCERIDAE.

BEZZI, M. 1912. Blefaroceridi Italianii con descrizione di una nova forma e di due specie esotiche. *Bol. Soc. Ent. Ital.*, 44: 3-114. (Larval key, p. 76.)

MANNHEIMS, B. J. 1935. Beiträge zur Biologie und Morphologie der Blepharoceriden (Dipt.) *Zool. Forschungen*, Band 2. Universitätsverlag von Robt. Noske, Leipzig, 115 pp., 69 figs. (Keys to larva and pupae occurring in the Alps, p. 80.)

**(To be continued)**

## New Records of Odonata for Southeastern Pennsylvania.

During the past three summers, I have done little collecting of these insects but obtained the following noteworthy additions to the local fauna at Cheyney, Delaware County, Pennsylvania. In 1936 at or very close to Smithson's Pond, *Lestes eurinus* (Say), a male, and *Nehalennia irene* Hagen, both sexes, were met on July 25, and a male of *Somatochlora tenebrosa* (Say) on September 1. On May 30, 1937, I took a male *Cordulegaster diastatops* Selys and on August 1, 1938, a male *Cordulegaster erroneus* Hagen, the last two not at the pond.—PHILIP P. CALVERT.

## Some Insects Accepted by the American Chameleon, Anolis carolinensis Voigt.

By H. Elliott McClure, Ames, Iowa.

During the past fifteen years eight American chameleons, *Anolis carolinensis* Voigt., have been kept in captivity for varying lengths of time, up to five years, and observed. They were purchased at fairs and circuses and freed in cages large enough to give them sufficient exercise. Green plants in the cages helped make the conditions more natural.

The animals will capture a wide variety of insects. They never attack a dead insect, but must capture it alive. Large field crickets, *Gryllus pennsylvanicus* Burm., greater in girth than the chameleon, can be eaten and the prey is gulped into the throat, where it remains distending the neck until it is predigested and passes into the stomach. In capturing its prey, the chameleon tenses its body, points its nose toward the insect, and gathers its hindlegs for the jump. As the insect walks closer, the lizard opens its mouth, sticks the tip of its tongue out, and bobs its head up and down as if aiming carefully. If the insect draws near and stops, the lizard will not strike, but remains motionless until the insect moves again. Then the strike is made. When very hungry it will jump eight or ten inches upon the insect, and very seldom misses.

Moths, flies, and other large insects are generally eaten head first and the wings scraped off by rubbing the head on some object, as a bird cleans its bill on a limb. Foreign objects gotten into the mouth can not be spit out, but are either scraped away or swallowed. Grass and sticks are sometimes swallowed because of this. Occasionally foreign matter is scraped from the side of the mouth by a hind foot.

The following groups of insects have been accepted regularly by the lizards:

Diptera; Muscidae, Sarcophagidae, Bombyliidae, Tabanidae, Syrphidae, Asilidae, Stratiomyiidae, Tachinidae and most other families.

Orthoptera; Tettigoniidae, Gryllidae and small Locustidae.
Neuroptera; Myrmelionidae, Hemerobiidae and Chrysopidae.
Odonata; Small Zygoptera.
Hemiptera; Miridae and very few others.
Hymenoptera; Tenthridinidae and small Ichneumonoidea.
Lepidoptera; butterflies such as, *Grapta interrogationis* (Fabr.), *Vanessa atalanta* (Linne), *Pyramcis cardui* Linne, and others; and moths such as, *Heliothis obsoleta* Fabr., *Carpocapsa pomonella* Linne, *Cirphis unipunctata* (Haworth), *Hemerocampa leucostigma* Smith and Abbott and many others including all available small moths.

The American chameleon discerns fine differences in its prey. For example, one chameleon had remained unfed for a week and was very hungry, so a box elder bug, *Leptocoris trivittatus* Say, was freed in the cage. Quickly the chameleon leaped across the enclosure to seize the victim, but hesitated, eyed the bug by turning its head to one side and, with almost a look of disgust, slowly climbed up a flower-stalk, allowing the bug to walk away. It is doubted that this lizard ever encountered a box elder bug before, but it refused to attempt to eat it. Size was not the deciding factor in the chameleon's decision, for it attacked horse flies or moths one-fourth to one-half its own size with alacrity.

At another time, this same lizard attempted to eat a red-legged grasshopper, *Melanoplus femur-rubrum* De Geer, and after a vicious struggle, during which the grasshopper kicked the lizard violently about the face, it succeeded in killing and eating it. The chameleon could never be induced to attack another grasshopper of any size after that. The lizards delight in crickets, but shun cockroaches. A wasp or bee is left to its own activities while a bee fly or a small ichneumon is snapped up. When a honey bee was released in the cage of a chameleon, it refused to eat the insect, but kept close watch upon its clumsy flight and avoided it. The bee was removed and a drone fly, *Eristalis tenax* Linne, released in the cage. It was immediately taken by the lizard. If numerous flies, such as blue-bottle flies, are released in the cage, the chameleon will

eat its fill, sometimes as many as ten or fifteen, and then, because the remaining flies disturb it by walking over it and getting their feet in its eyes, the lizard will systematically catch and crush each fly, and then scrape it from its mouth. In this way it relieves itself of the torment.

All of these instances show a fairly accurate degree of discernment. As the lizard always hesitates before it strikes, it has time to observe the prey and classify it as to its delectability, therefore mimicry and protective coloration in the insects seem to be of little value in protecting them from its attack.

## Three New Geophiloid Chilopods.

By RALPH V. CHAMBERLIN

The types of the new species described below are at present in the author's collection.

**Gosiphilus auximus** sp. nov.

This yellowish form has the usual conspicuously flattened body. Head broad, with basal plate equally broad and somewhat narrowed caudad. The antennae flattened and attenuate distally, contiguous at base. Prehensors concealed from above; the claws short, rather stout, when closed falling much short of anterior border of head; chitinous lines sharply defined and complete.

Spiracles small, circular. Ventral pores in a transversely elongate area. Last ventral plate wide as usual. Each coxa bearing about eight small, inconspicuous pores, about half of which are covered by the last ventral plate. Anal legs of male conspicuously and clavately thickened. Pairs of legs, 149.

Length, about 65 mm.

*Holotype:* Male, Edinburg, TEXAS, Oct. 16, 1936, (S. Mulaik).

This form seems readily distinguishable from *G. laticeps* in having typically 149 as against 81 pairs of legs.

**LEPTODAMPIUS** gen. nov.

The claw of the prehensors narrow and thin at base where excavated above as in *Agathotus*. It differs from the latter genus, however, in having the claw article of the prehensors with a conspicuous chitinous antero-mesal corner or tooth, as

well as in having the last ventral plate narrow instead of very broad, etc.

*Genotype, L. lamprus,* sp. nov.

**Leptodampius lamprus** sp. nov.

Pale yellow throughout. Cephalic plate short, with the frontal suture present. Antennae not distally attenuate. Prebasal plate not exposed. Basal plate slightly widened cephalad. Claws of prehensors when closed nearly attaining anterior margin of head; smooth, slender to abruptly wider but short basal portion which bears a chitinous angle or tooth at its antero-mesal corner. Chitinous lines not present.

Spiracles rather small, circular, the first not enlarged and those of posterior region scarcely reduced. First legs shorter and more slender than the second. And legs but little thicker and longer than the preceding pair. Last ventral plate moderate in breadth, narrowed caudad; corresponding tergite broad. Last coxae bearing about 15 small pores ventrally and laterally. Anal pores present. Pairs of legs, 63.

Length, about 37 mm.

*Holotype:* female, Boyer, OREGON, (J. A. Macnab).

**Brachygeophilus leionyx** sp. nov.

Color yellow throughout. Cephalic plate relatively broad, smooth and shining without sulci and with no definite frontal suture. Prebasal plate not exposed. Basal plate short, broad and trapeziform. Claws of prehensors when closed not attaining front margin of head, smooth, neither these nor other articles bearing denticles. Chitinous lines present, fine, incomplete anteriorly.

Spiracles circular, the first not larger than those immediately following, the others gradually decreasing caudad. Last ventral plate broad, trapeziform, the sides converging caudad, the caudal margin straight. Each of the last coxae bearing about 18 small pores, of which one is somewhat larger and stands by itself in a more caudal position; the others along and under border of ventral plate, and especially along dorsal plate and at anterior end. First legs decidedly shorter and more slender than the second pair. Anal legs in female much exceeding the penult in thickness and length, the claw long and smooth. Pairs of legs, 63.

Length, about 26 mm.

*Holotype*: female, and 1 *paratype* female, Boyer, OREGON, (J. A. Macnab.)

## The Concentration of Heliothis obsoleta Moths at Food. (Lepidoptera: Noctuidae).

By G. W. Barber, Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

Certain unusual and destructive infestations of the corn-ear worm, *Heliothis obsoleta* (F.), seem to result from concentrations of moths for feeding. Moths are attracted to plants in blossom; and if corn is not available at the time, the moths deposit eggs on these same plants. When not in blossom, the moths are attracted to these plants little if at all.

The first observed site of such a concentration was a 100-acre soybean field of the variety O-Too-Tan in Washington County, Georgia. During the third week of September, 1933, the plants of this field were in blossom, and on September 19 a tremendous population of *Heliothis obsoleta* was observed. Many times as many moths were present than had ever been noted by the author in a like area before; as one walked through the bean field moths arose in tremendous numbers. Later, these moths laid many eggs on the plants, certainly enough to result in the destruction of the crop had the eggs all hatched and had even a part of the larvae survived. At this time, in the vicinity of this field, very few *H. obsoleta* moths were found elsewhere, and practically no moths were to be found in fields of soybeans which were older and which bore less profuse bloom, although such plants were suitable as larval food.

It seemed probable that moths had migrated to this field to feed on the blossoms. Not only were the blossoms of other plants relatively scarce because of dry, warm weather, but the millions of blossoms in this field seemed to have had an attraction somewhat in proportion to the mass of bloom present.

These moths remained over a period of at least 2 weeks in the bean field, hiding among the plants during the hours of daylight. Possibly because corn was then unavailable, all having ripened, they laid eggs on the plants on which they had fed and among which they rested.

The second observed instance of concentration of these

moths for feeding was in Estill, South Carolina, where, in the first week of June, 1934, moths were very abundant in a late-planted flax field of about 25 acres, which was at the height of blossoming. Moths had apparently concentrated in this field from some distance because of the abundant food supply. Many eggs were laid on the flax plants, and the resulting larvae did considerable damage.

In this instance, corn ranging from a foot to 18 inches in height occurred in the vicinity, and would normally have attracted moths for oviposition. After remaining in the flax field for a week or 10 days, hiding among the plants during hours of daylight, the moths disappeared between June 14th and 18th; they were very abundant on the former date, while few remained on the latter date. Possibly they had migrated to corn fields in the vicinity.

During the first week in June, when moths became very abundant in the flax field described, they were absent or very scarce in earlier-planted flax fields which at that time bore fewer blossoms, although plenty of green bolls suitable as larval food were present. A generation of *H. obsoleta* had occurred in the flax fields during May, and the larvae had attacked, in particular, an earlier-planted field of 50 acres which adjoined the late-planted field. During the first week in June, adults emerged from the May brood of larvae in the larger field, but all those emerging in this earlier-planted field migrated to the late-planted field where blossoms were much more abundant. Moths emerging in other early-planted flax fields in the vicinity also migrated to the blossoming field. Few eggs were laid in any of the early-planted fields during the first week of June, and few moths hid in these early-planted fields. Available larval food, green bolls, seemed to have had little influence on oviposition. It seemed probable that the moths were attracted to the late-planted flax fields for food, and that they laid eggs somewhat incidentally. The mass of blossoms in a field at the height of blooming attracted many moths, while fewer blossoms in older fields attracted few.

These observations and many others seem to show (1) that

moths congregate in fields with an abundance of blossoms for feeding; (2) that it is possible that this food attracts moths in numbers and from distances somewhat proportionate to the mass of bloom; (3) that the moths may lay eggs on such plants, notwithstanding the fact that these may not be preferred or usual food plants; (4) that unusually severe injury to such plants by larvae may be traced to their attractiveness as feeding locations for the moths; (5) that large concentrations of moths have been observed only at times when corn was not available in attractive stages of growth, namely, early in the spring and during the fall.

## A Note on Synonymy in Spiders (Araneae: Salticidae and Argiopidae).

B. J. KASTON, New Haven, Connecticut

In 1932, Banks proposed a new name, *Allepeira,* for the genus known as *Hentzia* McCook 1894. He called attention to the fact that the name *Hentzia* had already been used by Marx for a spider belonging to the genus *Wala.* The publication containing Marx's generic name is a little known pamphlet by L. O. Howard, *"A list of the invertebrate fauna of South Carolina,"* being Chapter XI of *"Resources of South Carolina,"* published at Charleston, July 19, 1883. On page 1 appears the following statement: "With regard to the order Araneina (spiders) I have been enabled, through the kindness of Mr. George Marx, of Washington, to present not only a list of the described species, but to add to it a large number of undescribed species, indicated by Mr. Marx's manuscript names."

This list of spiders' names (pages 21 to 26 inclusive) contains, in addition to the many manuscript names, which being *nomina nuda* have no standing, three generic names associated with previously described species. One of these is *Hentzia,* to which Banks has already called attention (Marx listed *Hentzia palmarum* (Hentz) on p. 26). Since Keyserling's *Wala* was not established until 1884 and has for its type his *albovittata,*

which is the same as Hentz's *Epiblemum palmarum, Wala* becomes a synonym of *Hentzia* Marx. On page 22 appears *Ocrepeira ectypa* (Walck.); but Walckenaer's *Epeira ectypa* belongs in the genus *Wixia* O. P.-Cambridge 1882, of which accordingly *Ocrepeira* becomes a synonym. The third generic name with which we are concerned also appears on p. 22, and in association with two species: *Acanthepeira stellata* (Hentz) and *verrucosa* (Hentz). In 1888, *Epeira verrucosa* Hentz was shown by McCook to be the same as *E. arenata* Walck., and was made the type of a new genus, *Verrucosa,* (in the same manner as did Marx, by simply associating the new name with the already described species). The species *E. stellata* Hentz being the same as the one for which McCook in 1894 established the genus *Marxia,* it follows that the latter name becomes a synonym of *Acanthepeira* Marx.

Some question may arise as to whether Howard rather than Marx should be cited as authority. However, I think it is clear from an interpretation of Article 21 of the International Rules of Nomenclature [1] that the names should be credited to Marx. It is indeed unfortunate that Marx did not continue to use the names he had proposed. Since they were omitted from his catalogue of American spiders, and from the subsequent catalogues of Banks and of Petrunkevitch, their synonyms, instead, have come to be well known.

## Notes on the Eggpods of Appalachia hebardi and Dendrotettix quercus (Orthoptera: Acrididae; Cyrtacanthacridinae).

By JOHN W. H. REHN, Philadelphia, Pennsylvania.

While engaged in some local field work this summer it has been possible to obtain live material of both *Appalachia hebardi* and *Dendrotettix quercus,* the Post-Oak Locust. As there is no published information on the biology of either of these in-

[1] "The author of a scientific name is that person who first publishes the name in connection with an indication, a definition, or a description, *unless it is clear from the contents of the publication that some other person is responsible* for said name and its indication, definition or description." (Italics mine.)

teresting grasshoppers we have attempted to secure some data along these lines.

At the present time I have been able to obtain eggpods of both of these rather rare or, at least, exceedingly local grasshoppers and we believe that a brief description of these eggpods would be of some interest.

The pods of *Dendrotettix quercus* vary, in transverse section, from subquadrate to more or less rectangulate, the eggs being placed in an almost vertical position. The greatest length of the four pods examined varies from 4 to 6 mm. while the width remains relatively constant at about 4 mm. The number of eggs contained in these varies from six to eleven or twelve, all more or less vertical although usually inclined to some degree. The eggs of a pod may all be inclined in the same direction or they may be tilted in various directions, there appearing to be no regular pattern. The eggs, which are buckthorn brown, are about 5 mm. long and in lateral view are more or less elliptical. The eggs are surrounded and covered by a chestnut brown mucous matter which holds the mass together. In some of the pods before me this mucous material appears relatively transparent, while in others it is decidedly opaque.

While only one pod of *Appalachia hebardi* has been obtained its appearance is so unusual that it is noteworthy, yet at the same time it is my firm belief that the eggpod is perfectly normal. The whole mass is a subcircular disk with a diameter of about 9 mm. and a height of 3.5-4 mm. The eggs are directed obliquely and diagonally upward through the mass which contains approximately ten eggs. These eggs are more or less fusiform and are buckthorn brown. The mucous mass that surrounds the eggs is light sudan brown and quite frothy, having a very strong resemblance to the material found in a mantid öotheca.

It is my hope that I may be able to continue the work started on these forms and that some knowledge of their life history may be obtained.

## A Breeding Record for the Red-barred Sulphur (Callidryas philea Linn.) from Indiana (Lepid.: Pieridae).

During the last week of August, 1936, I was fly-fishing on Little Blue River in Union Township, Shelby County, Indiana, across the highway from Pitt's Playground. On a branch of the legume, wild senna, *Caffia marilandica,* which was bending over the water, I saw a golden-colored larva about fifty millimeters in length. The golden color was most conspicuous but there were some fine black lines running dorso-ventrally on the lateral surface of several segments. I carried the larva home on the branch for further observation. In the next few days it ate some small holes in the leaves and then formed a chrysalis. A short time later the adult emerged and was identified as *Callidryas philea.*

Seitz (1924) used the name of *Catopsilia philea* for this lepidopteron and states that it has been observed as a migrant in Illinois and that it is abundant from Texas to southern Brazil.

Holland (1931) points out that little is yet known of the early stages of this insect. He mentions that it occurs in Texas and has been found in Illinois as a straggler. It is abundant in Mexico, Central America, and southward.

Mrs. Kite (1934) says that this butterfly appeared at the Lake Taneycomo Region in the Missouri Ozarks on September 20, 1928 and also in October 1929.

LITERATURE CITED.

HOLLAND, W. J. 1931. The Butterfly Book, p. 289. Doubleday, Doran and Company, Inc., Garden City, New York.

KITE, MRS. R. B. 1934. Entomological News 45:36-39.

SEITZ, ADALBERT 1924. The Macrolepidoptera of the World. vol. 5, p. 86. Alfred Kernen Verlag, Stuttgart.

ROBERT H. COOPER, Ball State Teachers College, Muncie, Indiana.

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## Flashing of Fireflies

Flashing is the result of a rise and fall in the osmotic pressure of the photogenic cells. This phenomenon is under spontaneous cerebral control in the normal animal but can be imitated by injection of hypertonic solutions or by partial asphyxiation, thus producing a continuous glow.

MALOEUF in Annals, Entom. Soc. America, Sept., 1938.

## Biological Abstracts.

In the NEWS for June, 1935, page 168, we made a plea for support adequate to insure the continuance of *Biological Abstracts* and we pointed out why the *Abstracts* are of such transcending importance to the investigator and the teacher in Biology. The struggle to secure that support has continued. It has seemed to those now in charge of the *Abstracts* that not only should subscriptions to each complete yearly volume continue to be sought, but also that provision be made for supplying to those who desire them parts of each volume at, of course, reduced rates. For the year 1939 five such parts are projected:

I. General Biology to include General Biology, Biography-History, Bibliography, Evolution, Cytology, Genetics, Biometry and Ecology; price $4.00.

II. Experimental Animal Biology to include Animal Physiology, Nutrition, Pharmacology, Pathology, Anatomy, Embryology and Animal Production; price $9.00.

III. Microbiology and Parasitology to include Immunology, Bacteriology, Viruses, Parasitology, Protozoology and Helminthology; price $5.00.

IV. Plant Sciences to include Phytopathology, Plant Physiology, Plant Anatomy, Palaeobotany, Systematic Botany, Agronomy, Horticulture, Forestry, Pharmacognosy and Pharmaceutical Botany; price $6.00.

V. Animal Sciences to include Palaeozoology, Parasitology, Protozoology, Helminthology, Systematic Zoology and Economic Entomology; price $6.00.

The sum of the prices of the five parts is $30.00, but subscribers to the complete volume will receive it for $25.00.

The great advantages of *Biological Extracts* are still with the complete volume. The entomological part-subscriber will doubtless take Part V; so doing he will lose, at least, abstracts of many valuable articles on insect physiology and embryology included in Part II, on insect evolution, genetics and ecology for which he must look in Part I. A different grouping into parts may be devised for his needs. How far additional groupings may be desirable we do not pretend to know, but convinced as we now are and as we were in 1935 of the absolute necessity and prime importance of abstracts, the only satisfactory solution appears to us to be the complete volume. The expense to the individual may seem high, but it should have the first claim on his professional budget.

PHILIP P. CALVERT.

# Current Entomological Literature

**COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.**

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

**Note.** References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

**Papers published in the Entomological News are not listed.**

**GENERAL.—Barnes, H. F.**—Recent advances in Entomology. [Sci. Progr.] 33:117-123. **Fullaway, D. T.**—Orchid insects. [37] 10:43-49. **Gould & Deay.**—Notes on bionomics of roaches inhabiting homes. [Proc. Indiana Acad. Sci.] 47:281-284. **Huang, S. M. Yekfa.**—An abridged taxonomic catalogue of insects infesting stored grains and grain products. [Science, Sci. Soc., China] 22:165-179. **Huxley, J.**—Clines: an auxiliary taxonomic principle. [31] 143:219-220. **Isely, F. B.**—Survival value of Acridian protective coloration. [84] 19:370-389, ill. **Knowlton, G. F.**—Lizards in insect control. [43] 38:235-236. **Malaise, R.**—On the designation of generotypes by Fabricius. A response to McAtee. [28] 1938:99-106. **Tarshis, M. S.**—Surgical maggots in modern medicine. [76] 1938:252-257. **Weiss, H. B.**—Thomas Martyn's "English Entomologist." [6] 46:321-325. Paper from wasp's nests. [6] 46:244.

**ANATOMY, PHYSIOLOGY, ETC.—Babers, F. H.**—A septicemia of the southern army worm caused by Bacillus cereus. [7] 31:371-3. **Bergmann, W.**—The composition of ether extractives from the exuviae of the silkworm, Bombyx mori. [7] 31:315-321. **Bradley & Arbuthnot.**—The relation of the host physiology to development of the Braconid parasite, Chelonus annulipes. [7] 31:359-365, ill. **Bushnell, R. J.**—The relation of nutritional levels to the growth of populations of Tribolium confusum. I.—Growth of larval, pupal

and adult populations in cornmeal and cornmeal supplemented with yeast. [7] 31:345-351, ill. **Emden, F. van.**—See under Coleoptera. **Evans, J. W.**—The morphology of the head of Homoptera. [Pap. & Proc. R. Soc. Tasmania] 1937:1-20, ill. **Flanders, S. E.**—Cocoon formation in endoparasitic Chalcidoids. [7] 31:167-180, ill. **Forbes, J.**—Anatomy and histology of the worker of Camponotus herculaneus pennsylvanicus (Hym., Formicid.). [7] 31:181-195, ill. **Frolova, S. L.**—Development of the giant salivary gland nuclei of Drosophila. [31] 141:1014-1015, ill. **Gates, F. R.**—The structure of the chromosome. [J. R. Micro. Soc.] 58:97-111. **Glancy & Howland.**—Transplantation of mutant and wild type bristle-bearing tissues in Drosophila melanogaster. [92] 75:99-105, ill. **Goldschmidt, R.**—A note concerning the adaptation of geographic races of Lymantria dispar to the seasonal cycle in Japan. [90] 72:385-386. **Haskins & Enzmann.**—See under Hymenoptera. **Haug, G. W.**—Mass egg production by the Coccinellid Hippodamia convergens. [7] 31:366-369, ill. **Kowalczyk, A. A.**—A report on the intestinal protozoa of the larvae of the Japanese beetle. [Trans. Amer. Micr. Soc.] 57:229-244, ill. **Maloeuf, N. S. R.**—The basis of the rhythmic flashing of the firefly. [7] 31:374-380, ill. **Mattingly, H. E.**—The morphology of the alimentary tract of the blister beetle, Epicauta pennsylvanica (Coleo.: Meloid). [43] 38:250-263, ill. **Pelton, J. F.**—The alimentary canal of the Aphid Prociphilus tessalata. [43] 38:164-169, ill. **Quayle, H. J.**—The development of resistance to hydrocyanic gas in certain scale insects. [Hilgardia] 11:183-210, ill. **Slack, H. D.**—Chromosome numbers in Cimex. [31] 142:358. **Stiles, K. A.**—Intermediate-winged Aphids and the time-of-determination theory. [92] 74:430-460, ill. **Trager & Subbarow.**—The chemical nature of growth factors by mosquito larvae. [92] 75:75-84. **Vachon, M.**—Recherches anatomiques et biologiques sur la reproduction et la developpement des Pseudoscorpions. [3] (9 1:1-207, ill. **Williams, I. W.**—The comparative morphology of the mouthparts of the order Coleoptera treated from the standpoint of phylogeny. [6] 46:245-289, ill. **Woodworth, C. E.**—The reaction of wireworms to arsenicals. [47] 57:229-238.

**ARACHNIDA AND MYRIOPODA.—Ewing, H. E.**—A key to the gen. of chiggers (mite larvae of the subfamily Trombiculinae) with descriptions of n. gen. & spp. [91] 28:288-295. **Herman, C. M.**—Occurrence of larval and

nymphal stages of the rabbit tick, Haemaphysalis leporis-palustris, on wild birds from Cape Cod. [19] 33: 133-134. **Hilton, W. A.**—A new Symphylan from near Death Valley. ]13[ 30: 68-69, ill. **Jacot, A. P.**—More primitive moss-mites from North Carolina, III. [J. Elisha Mitchell Sci. Soc.] 54: 127-137, ill. (*). **Larson & Green.**—See under Hymenoptera. **de Mello-Leitao, C.**—Algunas Aranas nuevas. [Rev. Mus. Lat Plata) 1, Zool.: 89-118, ill. (S*). **de Mello-Leitao, C.**—Consideracoes sobre os Phalangodoidea com descricao de novas formas. [15] 10: 135-145, ill. **Remy, P.**—Die Eurupauropodidae (Myriapoda: Pauropoda) des Naturhistorischens Museum zu Wien. [Verh. Zool.-Bot. Ges. Wien] 86-87: 1-34, ill. (k.). **Verhoeff, K. W.**—Uber einige Amerikanische Myriapoden. [34] 122: 269-284, ill. (k*). Uber einige Chilopoden des Zoologischen Museum in Munchen. [34] 123: 123-130. (S*).

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